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11 April 1977

MEMORANDUM FOR THE RECORD

SUBJECT: ESVN Background and Status

1. The purpose of this MFR is to provide background and status of the Executive Secure Voice Network (ESVN) to enable the members of the Equipment Board to discuss the subject of ESVN KY-70 hardware procurement. Attachment A is an executive summary of the pilot ESVN program. Current status of the five phases of the program are:

Phase 1: Approximately 80% of 75-80 KY-70 equipments have been installed.

Phase 2: The KDC is being installed at NSA and should be operational in August 1977.

Phase 3: The community interface for two KY-3 circuits connected to the State Department 758C switch is to be completed in June.

Phase 4: Expansion of the ESVN has been deferred until evaluation of the initial pilot program is completed.

Phase 5: NSA has received authorization to develop the conference director and work done in 1977 will be primarily the design of the unit.

2. The KY-70 device is a fourth order Adaptive Predictive Coder (APC-4) which operates at approximately 6.4 KBS. The KYA cryptographic logic is implemented separately from the voice processor and line modem which are implemented on a programmable signal processor (CPU). The internal modem is designed for wire line application using standard DDD telephone lines. The unit does not have the capability for digital output although indications are that any retrofit program would include this change.

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3. The second generation E SVN equipment, STU II will utilize a tenth order Linear Predictive Coder (LPC-10) voice processor and be capable of digital output as well as use on DDD telephone lines. It is expected that LPC-10 will become the standard government narrowband voice processor during the 1980's. The LPC-10 processor is expected to operate at either 2.4 or 4.8 KBS.

4. The Agency has received four KY-70 units to participate in the pilot E SVN program. The original intent was to test the four units solely within OC offices. However, the Operations Center and the Office of Legislative Counsel have had requirements to install units in their offices. Subsequently, the DCI requested that NSA supply 12 KY-70 units for utilization in lieu of the SV-8 equipment in ESRN. As a result of the DCI request, installation of the four units has been deferred until some response from NSA is received.

5. Attachment B is a listing of documented domestic secure voice requirements. Attachment C is a listing of all [redacted]. Although not documented, it is believed there is a requirement for secure voice at a [redacted]. Once any portion of the requirements are satisfied OC may receive additional requests for service.

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6. There are several considerations to be discussed concerning procurement of KY-70 equipment at the present time.

A. There is presently no digital capability with the KY-70 and therefore precludes its use on SKYLINK.

B. Development of the STU II equipment is scheduled for late CY-79 and it is not expected that production STU II delivery would be prior to mid-1981.

C. KY-70 equipment, either from the pilot program or subsequently procured, must be retrofitted eventually to be compatible with STU II hardware. There has been no projection of the cost of such a retrofit, however, NSA is concerned that the existence and operational

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use of 300-500 KY-70 units would seriously impact the STU II program. It is possible that NSA would fund the retrofit for some 200 KY-70 equipments but that numbers above that would require funding by the equipment user.

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E. Should the Agency choose to procure KY-70 equipment, it is virtually certain that an interface between the KY-70 and the Tandem Switch would be necessary.

7. NSA has requested all agencies to respond in the five-year cryptographic equipment forecast if they wish to procure KY-70 equipment with FY-77 or FY-78 funds. Indications are that NSA will procure 30-50 units and other civil agencies have indicated a desire to procure some number, the normal range being 2-20. It is expected that NSA will procure at least 100 KY-70's before the end of FY-77 and that delivery would begin in late 1978. The cost of KY-70's will be \$35K in 100 quantity to \$21K in 1000 quantity.

8. Considering the [redacted] secure voice requirements and the availability of KY-70 equipment in late 1978, OC must decide whether to take advantage of the production or deny secure voice service until second generation hardware is available in mid-1981.

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Attachments:
As Stated

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EXECUTIVE SUMMARY

(S) Background

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Pilot ESVN

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25X1 The National Security Council issued a series of memoranda requesting solutions to the intercept problem in U.S. Government and commercial communications. This Executive Secure Voice Network (ESVN) Pilot Program Implementation Plan was developed in response to NSC tasking contained in NSDM 296 (23 May 1975) and NSDM 296 follow-up (24 November 1975). The tasking required submission of the Implementation Plan by 31 January 1976, and initial implementation of a Pilot ESVN by mid 1977.

(S) Threat and Vulnerability

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25X1 The intercept of communications concerning economic and personal matters has become a serious threat. This threat currently permeates segments of the U.S. economy such as energy, commodities, raw resources, and currency. Information in these areas can be extremely time-sensitive, and *a priori* knowledge and exploitation could create massive problems. For example, a great deal of damage could be done by a foreign power intercepting the daily Federal Reserve Board conference call between New York and Washington, which determines the day's U.S. foreign exchange rate. Much of this type of information is passed through open Government and commercial telephone Networks—making them potentially lucrative targets for intercept. And we know from Soviet defectors and FBI sources that the Soviets are intercepting U.S. telephone communications from diplomatic and possibly from commercial facilities such as those they have in Washington, New York, San Francisco, Pittsburgh, and Chicago.

ESVN Concept

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25X1 The ESVN will be able to secure, throughout a telephone system, all communications among various communities of interest dealing in matters affecting national security. Typical of these communities would be:

National Security/Defense	Economics and Trade
Executive	Law Enforcement/Protective
Legislative	Regulatory
Energy and Resources	Science/Technology

25X1 Such communications may involve, for example, Government contractors and consultants, oil companies and commodities dealers, as well as Government personnel. The ESVN solution is valid because these communities use the DDD/FTS and other narrowband telephone networks to conduct day-to-day business, and the ESVN can provide end-to-end security for these networks. The security components of this system operate transparently with the remaining components (which are part of existing telephone systems)—that is, the two sets of components are fully compatible, and neither adversely affects the operation of the other.

Pilot ESVN Program

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25X1 The ESVN concept will be implemented in a pilot program structured to provide, in addition to a secure telephone capability, an evaluation of security components (technical performance, security, and subscriber reaction). The Pilot ESVN will begin operation in mid 1977.

25X1 NSDM 296 and the follow-up memorandum requested a list of potential subscribers who could receive Pilot ESVN system hardware. A list of Government and Government-related potential subscribers and hardware allocations are provided in Table 3.4-1. The NSC should approve 100 of these allocations by 1 March 1976 to allow for timely subscriber coordination.

- 25X1 The NSC should decide whether security need and the Pilot program opportunity to test new and advanced technology justify implementing the Pilot ESVN with a population larger than 100 subscribers. A list of additional potential subscribers and 650 hardware allocations is provided in Table 3.4-2 for NSC review. To allow for continuity in development and/or production activities, an NSC decision in this regard by 1 April 1976 is desirable.
- 25X1 Funding mechanisms and dollar amounts required for the development, procurement, implementation, operation and maintenance of the Pilot ESVN are in section 3.8. The funding mechanisms include using DoD funds for all development and cryptomaterial production; having the individual subscribers reimburse (over five-year periods) the GSA Federal Telecommunications revolving fund, used for the procurement of Pilot ESVN hardware; and having the individual subscribers reimburse GSA for installation and maintenance services. The NSC should consider supporting the approval of these resources and the augmentation of the respective budgets by the amounts presented.
- 25X1 *Hardware Development* The major security components of the Pilot ESVN are the Secure Telephone Unit (STU), the cryptographic Key Distribution Center (KDC), and the secure Conference Director (CD).
- 25X1 A final development contract for 100 first-generation STUs was let in April 1975. These will be available for initial Pilot ESVN use in January 1977. Options are available that could produce reconfigured (better voice quality) first-generation STUs in January 1979, and/or expedited second-generation STUs (better voice quality, lower costs) late in 1979.
- 25X1 A final KDC development contract was let in November 1975. The KDC to be used in the Pilot ESVN will be available in May 1977. A second KDC for the Pilot ESVN could be produced by June 1979.
- 25X1 A development effort on the CD will begin in June 1976, with initial availability possible in October 1979.
- 25X1 *Scheduling*
- 25X1 The Pilot ESVN is scheduled to be implemented in five operational phases spanning January 1977 to October 1979. Details are presented in section 3.5.
- Phase I, STU Evaluation, lasts from January 1977 to September 1977. Its purpose is to evaluate the performance of the STUs in a network with a manually distributed common cryptographic key variable. This phase is to include 30 to 35 STU allocations to subscribers experienced with COMSEC hardware.
- Phase II, KDC Evaluation, lasts from April 1977 to December 1977. Its purpose is to evaluate the performance of KDC operation in the network. The STUs will be in the KDC mode (i.e., receiving cryptographic key automatically on a per-secure call basis). Following successful KDC-STU interaction, the network population will be filled out to the NSC-approved 100 STU subscriber allocations.
- Phase III, Pilot ESVN—AUTOSEVOCOM I Interoperability, lasts from January 1978 to April 1978. Its purpose is to evaluate interoperability between Pilot ESVN subscribers using TSEC/KY-3s in AUTOSEVOCOM I and the Pilot ESVN subscribers using STUs in the DDD and/or FTS telephone network.
- Phase IV, Pilet ESVN Growth, lasts from May 1978 to April 1979. After NSC approval, additional STUs (up to 650) could be allocated and a second operational KDC (purchased, operated, and maintained by GSA) added to the Pilot ESVN. The purposes of this phase are to respond to urgent requirements for STUs, evaluate the reconfigured first-generation or expedited second-generation STU performance, and evaluate the interaction of two KDCs.
- Phase V, CD Evaluation, lasts from January 1980 to June 1980. The purpose of this phase is to evaluate the performance of the CD in the Pilot ESVN.

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Management

The management of the Pilot E SVN is divided into three major areas: Program Management, Technology Management, and Network Management. These major areas are described in 3.6.

The NSC Ad Hoc Panel on Telecommunications Security is the Program Manager, having major decision and guidance authority. Reporting to the Panel are the NSC, for subscriber approval; GSA, on network management; NSA, on threat and technology management; NCS, for subscriber recommendations; and OTP, on legal and policy issues.

NSA is the Technical Manager and is responsible for the development and procurement (but not funding) of all Pilot ESVN hardware and associated cryptographic materials. It is also responsible for hardware training and modification control. Although NSA is the initial operator and maintainer of the KDC, GSA will eventually perform these KDC functions.

GSA is the prime Network Manager and is responsible for hardware installation and maintenance, and other network operational areas such as quality control, telephone directory preparation and upkeep.

Cost Analysis

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The Pilot ESVN has research and development (R/D), procurement (PROC), implementation (IMPL), and operation and maintenance (O/M) cost elements. The cost analysis section (3.7) considers all Government costs incurred as a result of the Pilot ESVN.

For 100 first-generation STUs, one operational KDC, and one operational CD, the high and low cost estimates are: R/D—\$14.7M/14.7M (all but \$4.0M funded); PROC—\$0; IMPL—\$372k/261k; and annual O/M—\$508k/296k.

For 650 reconfigured first-generation STUs and an additional operational KDC, the high and low cost estimates are: R/D—\$1.2M/800k; PROC—\$21.9M/17.8M; IMPL—\$860k/710k; and annual O/M—\$2.2M/1.3M.

For 650 expedited second-generation STUs and an additional operational KDC, the high and low cost estimates are R/D—\$10.0M/9.6M; PROC—\$14.6M/9.7M; IMPL—\$722k/630k; and annual O/M—\$2.1M/1.2M.

ESVN Evolution

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ESVN evolution from the pilot program could be in two areas. One addresses a foreign power intercept threat where national security is involved; the second addresses a threat (from virtually anyone) to information considered privileged by any U.S. citizen or group.

The technology associated with the threat to national security information can be similar to that employed in the Pilot ESVN, and implementation can be a direct outgrowth of the pilot program. Full production of applicable STUs can begin in 1981. Legal and policy issues are under review in the OTP-sponsored study to be completed in June 1976.

Pilot ESVN technology may not be directly applicable to the threat associated with information considered privileged by private citizens; however, the operational experience gained through the pilot program will be valuable. Because of the many unknown technical, legal, policy, control, and management issues, implementation in this area probably could not start until 1984. The OTP study is addressing a number of these issues.

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